N 536 - Utilization of Nursing Research in Advanced Practice, Summer 2008

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Research Design

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Design Characteristics

- Maximizes control over factors to increase the validity of the findings
- Guides the researcher in planning and implementing a study
Level of Control: Quantitative Research

- Descriptive
- Correlational
- Quasi-experimental
- Experimental
Concepts Relevant to Research Design (1)

**Causality**

A \[\rightarrow\] B  
Pressure \[\rightarrow\] Ulcer

**Multicausality**

Years smoking  
High fat diet \[\rightarrow\] Heart disease  
Limited exercise \[\rightarrow\] Heart disease
• Probability: Likelihood of an outcome
• Bias: Slanting findings
• Manipulation: Treatment
• Control: All phases of design
Design Validity

- Measure of accuracy of a study

- Examined with critique of the following dimensions:
  - Statistical conclusion validity
  - Internal validity
  - Construct validity
  - External validity
Elements of a Strong Research Design (1)

- Controlling the environment of the study setting

- Levels of controlling:
  - Natural setting
  - Partially controlled setting: e.g., clinics
  - Highly controlled setting: e.g., laboratory
Elements of a Strong Research Design (2)

- Controlling the equivalence of subjects and groups
  - Random subject selection
  - Random assignment to groups
• Controlling the treatment
  
  ○ Choose a treatment based on research and practice
  ○ Develop a protocol for implementation
  ○ Document the implemented treatment
  ○ Use a check-list to determine the extent of completeness to which the treatment was implemented
  ○ Evaluate the treatment during the study
Elements of a Strong Research Design (4)

- Controlling measurement
  - Reliability
  - Validity
  - Number of measurement methods
  - Types of instruments
Elements of a Strong Research Design (5)

- **Controlling extraneous variables**
  - Identify and eliminate extraneous variables via sample criteria, choice of settings, or research design
  - Random sampling
  - Sample: Heterogenous, homogeneous, or matching
  - Statistical control
Problems with Study Designs

- Inappropriate for the study purpose or the research framework
- Poorly developed designs
- The research methods were poorly implemented
- Inadequate treatment, sample, or measurement methods
Selecting a Design

Is there a treatment?

Yes

Is the treatment tightly controlled by the researcher?

Yes

Will a randomly assigned control group be used?

Yes

Is the original sample randomly selected?

Yes

Experimental Study

No

Quasi-Experimental Study

No

Will the sample be studied as a single group?

Yes

Descriptive Design

No

Correlational Design

No

Research Design

Yes

Is the primary purpose examination of relationships?
Selecting a Descriptive Design

Examining sequences across time?

- No
  - One Group?
    - No
      - Comparative
        - Descriptive
        - Design
    - Yes
      - Descriptive
        - Design
- Yes
  - Following same subjects across time?
    - No
      - Cross-sectional design
    - Yes
      - Data collected across time
        - Studying events partitioned across time?
          - No
            - Trend Analysis
          - Yes
            - Repeated measures of each subject
              - Yes
                - Case Study
              - No
                - Longitudinal Study
                  - Yes
                    - Single unit of study
A Typical Descriptive Design

Clarification ➔ Measurement ➔ Description ➔ Interpretation

Phenomenon of Interest

Variable 1

Variable 2

Variable 3

Variable 4

Description of Variable 1

Description of Variable 2

Description of Variable 3

Description of Variable 4

Interpretation of Meaning

Development of Hypotheses

Research Design
A Comparative Descriptive Design

Group I {variables measured} -> Describe -> Comparison of Groups on Selected Variables -> Interpretation of Meaning

Group II {variables measured} -> Describe -> Development of Hypotheses
Selecting the Type of Correlational Design

Describe relationships between/among variables?

Predict relationships between/among variables?

Test theoretically proposed Relationships?

Descriptive correlational design

Predictive correlational design

Model testing design
A Descriptive Correlational Design

Measurement

Research Variable 1

Description of variable

Examination of Relationship

Interpretation of Meaning

Research Variable 2

Description of variable

Development of Hypotheses

Research Design
A Predictive Design

Value of Intercept + Value of Independent Variable 1 + Value of Independent Variable 2 = Predicted Value of Dependent Variable
Selecting The Type of Quasi-Experimental Design

Control Group?
- No
  - Pretest?
    - No
      - One-group post-test only design
    - Yes
      - Repeated Measures?
        - No
          - Strategy for Comparison
            - No
              - Suggest Reevaluating design
            - Yes
              - One group pretest/post-test design
        - Yes
          - Compare treatment & control conditions?
Selecting The Type of Experimental Design

- Pretest
  - No
    - Post-test only control group design
  - Yes
    - Repeated Measurements?
      - No
        - Examine effects of confounding variables?
          - No
            - Multiple sites?
              - Pretest/post-test control group design
          - Yes
            - Blocking?
              - No
                - Randomized clinical trials
              - Yes
                - Comparison of multiple levels of treatment
                  - No
                    - Examination of complex relationships among variables in relation to treatment
                  - Yes
                    - Nested Designs

Pretest-Post Test, Control Group Designs

<table>
<thead>
<tr>
<th>Randomly selected experimental group</th>
<th>Measurement of dependent variables</th>
<th>Manipulation of independent variables</th>
<th>Measurement of dependent variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomly selected control group</td>
<td>PRETEST</td>
<td>TREATMENT</td>
<td>POST-TEST</td>
</tr>
</tbody>
</table>

Treatment: Under control of researcher

Findings:
- Comparison of pretest and post-test scores
- Comparison of experimental and control groups
- Comparison of pretest-post-test differences between samples

Example:
Your self (1990). The impact of group reminiscence counseling on a depressed elderly population.

Uncontrolled threats to validity:
- Testing
- Instrumentation

Restricted generalizability as control increases
## Post-Test-Only Control Group Design

<table>
<thead>
<tr>
<th>Measurement of independent variables</th>
<th>Measurement of dependent variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomly selected experimental group</td>
<td>TREATMENT</td>
</tr>
<tr>
<td>Randomly selected control group</td>
<td></td>
</tr>
</tbody>
</table>

### Treatment:
Under control of researcher

### Findings:
Comparison of experimental and control groups

### Example:

### Uncontrolled threats to validity:
- Instrumentation
- Mortality
- Limited generalizability as control increases
## Pain Control Management

<table>
<thead>
<tr>
<th>Traditional care</th>
<th>PRN Medication</th>
<th>New approach: “Around the clock” medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit A</td>
<td>Unit B</td>
<td>Unit E</td>
</tr>
<tr>
<td>Unit C</td>
<td>Unit D</td>
<td>Unit F</td>
</tr>
<tr>
<td>Unit C</td>
<td></td>
<td>Unit G</td>
</tr>
<tr>
<td>Unit D</td>
<td></td>
<td>Unit H</td>
</tr>
</tbody>
</table>

### Primary Nursing Care

<table>
<thead>
<tr>
<th>Unit A</th>
<th>Unit B</th>
<th>Unit C</th>
<th>Unit D</th>
<th>Unit E</th>
<th>Unit F</th>
<th>Unit G</th>
<th>Unit H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Care</td>
<td>No Primary Care</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Research Design*
Advantages of Experimental Designs

- More controls in design and conducting a study
- Increased internally validity
  - Decreased threats to design validity
- Fewer rival hypotheses
Advantages of Quasi-Experimental Designs

• More practical
  ○ Ease of implementation

• More feasible
  ○ Resources, subjects, time, setting

• More generalizable
  ○ Comparable to practice
Developing the Design Section of Your Proposal

- Identify the design
  - Name it specifically

- Provide a map of the design
- Discuss your rationale for using this design
- Describe threats to the validity of the chosen design